

**Meeting Minutes
Hand Held Task Group
November 17, 2004
Lisbon Portugal**

INTRODUCTION

Louise Speitel presented copies of the proposed wording of the Advisory Circular for the Halon Replacement Agents in Hand Held Extinguishers and asked for comments from the group of attendees (21 attendees). Louise previously posted a draft of the AC on the FAA Fire Test Center website; <http://www.fire.tc.faa.gov/pdf/systems/ac20-42xxDraftHalocarbonHandheldAC08-Nov-2004.pdf>.

The task group is providing input to the FAA Fire Safety Branch which will provide guidance material to the FAA Aircraft Certification Office. The Guidance material includes a draft AC for halocarbon hand-held fire extinguishers. The FAA Aircraft Certification Office is the writing/approving group of the FAA.

DISCUSSION

Toxicity Limits

Bradford Colton of AMPAC:

If we release this AC as written we will have a lot of problems with Halon 1211. The old data did not have PBPK modeling in the past. PBPK data is conservative per the EPA so it allowed the use of Halon 1211 in room sizes smaller than 617 cubic feet as proposed.

Louise Speitel of FAA WJH Technical Center:

The UL Standard was lenient because a person could evacuate the room (after discharging an extinguisher). The AC uses the more conservative NOAEL. (Because the occupants of an airplane cannot evacuate.) (The EPA has recommended the use of the LOAEL for standard occupancies (UL 2129), The EPA and the toxicologists in this task group recommend the use of the Safe Human Exposure Concentration for aircraft cabins. The NOAEL can be used in the absence of that data for aircraft.)

The allowed concentration of Halon 1211 in AC 20-42C was based on (very limited) human exposure data. The proposed guidelines for halocarbons provide safe human concentrations based on PBPK modeling of (more extensive) animal data. (Toxicologists strongly recommend that this science-based model be used. It is more accurate. It is the basis for the NFPA 2001 toxicity guidelines. The PBPK model provides results consistent with human exposure data for Halon 1211)

Bob: Put NFPA 2001 info in the AC.

Stratification:

Bradford :

Bradford is advocating the use of stratification in the proposed AC calculations since there is a lot of data with Halon 1211.

Bradford:

Toxicity is more important for small aircraft and stratification should be looked at for its effect.

Louise:

In the 1980s, tests were conducted using Halon 1211 and 1301 5BC extinguishers in small aircraft. Recent PBPK modeling of those tests shows that peak arterial blood concentrations were reached within a short time with rapid (1 air change per minute) ventilation. There was significant stratification, resulting in PBPK safe nose height conditions for most of the FAA wind tunnel tests (using 5B:C) conducted in the (139 cubic foot) Cessna (model 210C aircraft). But belt level concentrations matched the lower concentrations (below the instrument panel). There was then and still is a concern that the pilot may bend over to check or adjust aircraft controls or check for fire extinguishment. There is also a concern for shorter occupants as well as children.

Louise:

It is reasonable to assume perfect mixing for the calculation within this AC. The distribution of agent depends on many factors.(eg.: Directional- directed at a seat, under an instrument panel, overhead.) (eg: Time- an exposure to short peak concentrations, exceeding safe 5 minute concentrations, for a short duration can be unsafe. Upon exposure, the arterial blood concentration increases very rapidly. The arterial blood concentration increases even more rapidly for the halon replacements than for Halon 1211.)

(An exposure to a constant LOAEL concentration of Halon 1301 for 30 seconds results in an arterial concentration 85% of what would be attained for a 5 minute LOAEL exposure. An exposure to a constant LOAEL concentration of Halon 1301 for 15 seconds results in an arterial concentration 68 % of what would be attained for a 5 minute LOAEL exposure. An exposure to a constant 1.5 x LOAEL concentration of Halon 1301 for 15 seconds results in a critical arterial concentration 1.5 x 68 = 100 % of what would be attained for a 5 minute LOAEL exposure.)

Being conservative with perfect mixing will allow safer use for all including small children. Previous tests in a Cessna were at the height (nose level) of a male pilot.

Bob Glaser of Kidde:

We are very much aware that decay is rapid (when an agent is discharged) so stratification may play a part in concentration. So, will perfect mixing be excluded in lieu of nomographs?.

Louise:

So what height would nomographs be calculated for?

Bradford:

Maybe at a child seat height?

Louise:

Stratification nomographs will not be practical for this new AC.

Bob Glaser:

Thermal stratification will become (eventually) perfect mixing.

Phasing out of Halons?

Rahal Yebba of Airbus:

When the AC is put into place, how soon will the aircraft manufacturers have to convert?
How soon will this (AC) be released?

Louise:

There is no imminent plan by the aviation authorities to update the old AC (AC20-42C). The first effort will be to enable getting halon replacements onboard aircraft. We have 20 years of experience with Halon 1211 and a good safety record. We need to get halon replacements on board quickly and we are concentrating on that effort.

I don't know (when the AC will be released). I hope to provide FAA Aircraft Certification guidance material for them to write the AC. They will take it from there.

100 ft³ Stipulation

Question from someone:

Would extinguishers used for an aircraft the size of 100 ft³ need to pass the MPS?

<http://www.fire.tc.faa.gov/pdf/01-37.pdf>

(Note that the MPS is only for 5B:C size extinguishers for transport category aircraft.)

Bradford:

I am uncomfortable with 100 ft³. Why don't we use a cutoff point that is arrived at experimentally?

Louise:

The old AC (AC20-42C) recommends aircraft smaller than 4 total occupants use a 2B:C size Halon 1301 extinguisher. But 5B:C 1211 extinguishers (AC20-42C) are recommended for all planes no matter how small. The 100 cubic foot cutoff (new AC) was based on agent toxicity.

Bradford:

Lots of smaller aircraft are using Halon 1211 in 2B:C size extinguishers.

A minimum requirement (proposed AC) is 2B:C for 100 or less. Let's look at a technical basis for 5B:C cutoff at 100 ft³.

Bob:

Guidance from Dick (Hill) was never to reduce the level of (fire) safety. Have we reduced the level of safety of (smaller) aircraft if we put limits on 1211 replacements?

Louise:

I would like to see this new AC rewritten to recommended 5BC extinguishers for all sized aircraft. (This is based on past FAA halon test data in small planes.) (The 100 ft³ stipulation was based on toxicity concerns, but it should be dropped from the document. FAA should recommend sufficient fire protection.)

Sham Hariram of Boeing:

It recommends a minimum of a 2B:C but you can use a larger extinguisher on the airplane.

Author of following sentence uncertain, could be Sham.

NFPA says use a 2B:C in a 4 seater.

Dick Hill of FAA Tech Center

This AC is not a rule. I get rule questions from inspectors and this guidance material will help inspectors figure out what size is too big based on toxicity because the rule only states 'minimum size that is capable of putting out a fire that is likely to occur'. (See FAR 25.851(a)(7)). Use this AC for the judgment of toxicity of the extinguisher. Use the rule for the size of the extinguisher.

Louise:

So should we strike out the 100 ft³ as a cutoff for 2B:C extinguisher?

Bob:

Will a 5 B:C (even) fit in a smaller aircraft?

Louise: The rule also states toxicity guidelines. ("Each extinguisher intended for use in a personnel compartment must be designed to minimize the hazard of toxic gas concentration", FAR 25.851(a)(8)_. So the rule has two parts that might be in conflict.

Ed Nixon from Gulfstream:

If I have a 100 ft³ Airplane, I can only use FE-36. The agent toxicity chart (showing) minimum compartment volume is a good chart and should be left in (the AC).

Bob:

The chart is good but allows some latitude.

Louise: Nomograms (based on PBPK modeling of perfect mixing concentration histories)

would allow slightly higher concentrations of agent. Something in the order of 15 percent more agent (This also depends on the agent) for very high air exchange rates of 1 exchange per minute.

Comment from someone:

Keep in mind that windows can be opened to ventilate small aircraft.

Bradford:

The non ventilated case is covered in the AC. Can't exceed these concentrations. How about the ventilated case if no PBPK data is available? (Do we) use the guidelines of the non-ventilated case if only one extinguisher is used? (If no PBPK data is available, the AC calls for using guidance of the non-ventilated case, based on the weight of ALL the extinguishers on board)

Bob:

We'll take a shot at rewriting the ventilated case.

Bradford:

The old AC had a nomograph that quoted as saying, "nomograph applies per unit". This AC lists the safe exposure guidelines if ALL extinguishers are used.

Rich Mazzone of Boeing:

A representative from ALPA pointed out that the AC was difficult to read. It is very technical.

Adam Chattaway of Kidde:

Include a summary at the front of the AC.

Meeting was adjourned after almost 2 hours of discussion. Additional comments to the proposed wording of this AC were requested, in writing, to be sent to Louise.

Minutes Submitted by Rich Mazzone and Louise Speitel

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